# APPARATUS FOR LAYING A LENGTH OF MATERIAL ON A SURFACE

## Background of the Invention

The present invention relates generally to laying material from a roll of material, and more specifically to a vehicle for unrolling a roll of sod to lay a length of sod on a surface.

Powered vehicles are typically used to unroll rolls of sod to lay the sod on surfaces such as residential yards, commercial yards, athletic fields, and the like. Conventional vehicles for laying sod generally include a support for engaging the roll to transport the roll to the appropriate location and to unroll sod from the roll when the vehicle is propelled forward. However, the supports of such conventional vehicles are generally difficult to engage with the roll of sod. Additionally, conventional vehicles for laying sod may be difficult to maneuver into position for laying the sod and may be difficult to maneuver when unrolling the roll. To improve maneuverability, some vehicles include tracks for engaging and propelling the vehicle along the surface on which the sod is being laid. However, the tracks of such vehicles may tear or damage sod already laid on the surface, particularly while the vehicle is turning, which may require smoothing or replacement of the torn/damaged sod. The tracks of such vehicles may also dislodge from the vehicle when the vehicle is turned sharply or is driven over a sloped or uneven surface. Additionally, conventional vehicles for unrolling sod rolls may suffer from slow ground speed, low ground clearance, as well as poor traction.

## Summary of the Invention

In one aspect, the present invention includes a vehicle for unrolling a roll of material to lay a length of the material on a surface. The vehicle includes a vehicle frame having a forward end and a rearward end opposite the forward end, and a pair of driving wheels mounted on the frame for selectively independent rotation with respect to the frame about an axis of rotation extending generally parallel to the surface and transverse to the frame. The vehicle also includes a power source mounted on the frame and operatively connected to the pair of driving wheels to selectively rotate the driving wheels about the axis of rotation for propelling the vehicle along the surface and for controlling a direction of travel of the vehicle along the surface. The power source is

adapted to independently rotate each of the driving wheels about the axis of rotation in both a forward rotational direction and a reverse rotational direction opposite the forward rotational direction thereby providing the vehicle with a turning radius of about zero degrees. The vehicle further includes at least one caster for stabilizing the vehicle on the surface. The caster is rotatably mounted on the frame for rotation with respect to the frame about a central axis extending generally parallel to the surface, and is rotatably mounted on the frame for rotation with respect to the frame about a pivot axis extending generally perpendicular to the surface. A support member is mounted on the frame for pivotal movement with respect to the frame to raise and support the roll of material in a raised position above the surface for transportation of the roll of material prior to unrolling, lower the roll of material onto the surface for engagement with the surface, and facilitate unrolling the roll of material to lay the material on the surface when the roll of material is engaged with the surface and the vehicle is propelled along the surface.

In another aspect, the present invention includes a vehicle for unrolling a roll of material to lay a length of the material on a surface. The vehicle includes a frame having a forward end and a rearward end opposite the forward end, a pair of driving wheels rotatably mounted on the frame adjacent the rearward end for rotation with respect to the frame in a forward rotational direction and a reverse rotational direction opposite the forward rotational direction, and a pair of casters rotatably mounted on the frame adjacent the forward end for rotation with respect to the frame in the forward rotational direction and the reverse rotational direction. The pair of casters are rotatably mounted on the frame for rotation about a pivot axis of rotation extending generally perpendicular to the surface and generally perpendicular to the forward and reverse rotational directions. The vehicle also includes a power source mounted on the frame and operatively connected to the pair of driving wheels to drive the driving wheels for propelling the vehicle along the surface and for controlling a direction of travel of the vehicle along the surface. The power source is adapted to independently drive each of the driving wheels in both the forward rotational direction and the reverse rotational direction so the vehicle has a turning radius of about zero degrees. The vehicle further includes a support member pivotally mounted on the frame for pivotal movement with respect to the frame between a raised position wherein the roll of material is supported

above the surface by the support member for transportation of the roll of material prior to unrolling thereof, and a lowered position wherein the roll of material is engaged with the surface and is adapted to unroll as the vehicle travels along the surface to lay a length of the material thereon.

Other features of the present invention will be in part apparent and in part pointed out hereinafter.

Brief Description of the Drawings

Fig. 1 is a perspective of a vehicle of the present invention for unrolling a roll of material such as sod to lay a length of material on a surface;

Fig. 2 is another perspective of the vehicle illustrated in Fig. 1;

Fig. 3 is a perspective of a support member of the vehicle;

Fig. 4 is a side elevation of the vehicle illustrating the support member in a lowered position; and

Fig. 5 is a side elevation of the vehicle illustrating the support member in a raised position.

Corresponding reference characters indicate corresponding parts throughout the several views of the drawings.

Detailed Description of the Preferred Embodiment

Referring now to the drawings, and more specifically to Figs. 1 and 2, a vehicle of the present invention is designated in its entirety by the reference numeral 20. The vehicle 20 includes a frame 22, a pair of driving wheels 24 (only one of which is visible in Fig. 1), a power source (generally designated by 28), a pair of casters 30, and a support member (generally designated by 32).

The vehicle frame 22 has a forward end (generally designated by 34) and a rearward end (generally designated by 36) opposite the forward end. The driving wheels 24 are mounted on the frame 22 for selective independent rotation with respect to the frame about an axis of rotation 38 extending generally parallel to a surface 40 on which the vehicle 20 rests (e.g., earth) and extending generally transverse to the frame. The wheels 24 are mounted on the frame for rotation about the axis of rotation 38 in a forward rotational direction 42 and a reverse rotational direction 44 opposite the forward rotational direction. The power source 28 is mounted on the frame and operatively

connected to the driving wheels 24 to drive the wheels, and more specifically to selectively rotate the wheels about the axis of rotation 38, for propelling the vehicle 20 along the surface 40. The power source 28 is adapted to independently rotate each of the driving wheels 24 about the axis of rotation 38 in both the forward rotational direction 42 and the reverse rotational direction 44 to control a direction of travel of the vehicle 20 along the surface 40. Independently rotating each of the driving wheels 24 in both the forward and reverse rotational directions 42, 44 not only provides a means for controlling a direction of travel of the vehicle 20, but also provides the vehicle with a turning radius of about zero degrees to increase the maneuverability of the vehicle.

Although other means and/or configurations (e.g., separate power sources for each wheel 24) may be used to permit the power source 28 to independently rotate each of the driving wheels 24 without departing from the scope of the present invention, in one embodiment the power source is operatively connected to the wheels 24 via a conventional independent drive transmission (not shown). **(Is the transmission selected separately from the rest of the vehicle, i.e, is it common to select different transmissions when selecting a particular tractor?)** Additionally, although other power sources (e.g., an electric motor) may be used without departing from the scope of the present invention, in one embodiment the power source 28 is a gasoline powered, internal combustion engine. For example, in one embodiment the power source 28 is a _____ combustion engine, commercially available from _____ of _____.

The casters 30 are mounted on the frame 22 for stabilizing the vehicle 20 on the surface 40. To accommodate movement of the vehicle 20 along the surface 40, each of the casters 30 is rotatably mounted on the frame 22 for rotation with respect to the frame in the forward rotational direction 42 and the reverse rotational direction 44 about a central axis 46 extending generally parallel to the surface 40 and generally parallel to the axis of rotation 38. Additionally, to accommodate a change of a direction of travel of the vehicle 20 along the surface 40, the casters 30 are each rotatably mounted on the frame 22 for rotation with respect to the frame about a respective pivot axis 48 extending generally perpendicular to the surface 40 and extending generally perpendicular to the forward and reverse rotational directions 42, 44.

Although the vehicle 20 is illustrated herein as including a pair of casters 30, it should be understood that the vehicle 20 may include any number of casters 30 (e.g., only one caster 30) mounted on the frame 22 to stabilize the vehicle 20 on a surface without departing from the scope of the present invention. Additionally, although the drive wheels 24 are illustrated herein as being mounted on the frame 22 generally adjacent the rearward end 36, and the casters 30 are illustrated herein as being mounted on the frame generally adjacent the forward end 34, it should be understood that the drive wheels may be mounted on the frame generally adjacent the forward end and the casters may be mounted on the frame generally adjacent the rearward end. Furthermore, other mounting configurations for the drive wheels 24 and the casters 30 may be used without departing from the scope of the present invention.

As illustrated in Fig. 3, the support member 32 is adapted to engage and support a roll of material (generally designated by 50) such as sod for transportation of the roll to a predetermined location on the surface 40 and for unrolling the roll to lay sod on the surface when the vehicle 20 is propelled therealong. More specifically, the support member 32 includes a cross-member 52 pivotally mounted on the frame 22. A pair of arms 54, 56 are mounted on the cross-member 52 and each arm extends from a respective end (generally designated by 58, 60) of the cross-member. Each of the arms 54, 56 extends between a first end 62, 64 (e.g., a back end) adjacent the cross-member 52 and a second end 66, 68 (e.g., a front end) opposite the respective first end. A cradle (generally designated by 70) extends from the second end 66, 68 of each respective arm 54, 56 for supporting the roll of sod 50. More specifically, the roll of sod 50 includes a central diametrical opening 72, and the cradle 70 includes a pair of inner cradle plates 74, 76 each extending from a respective arm of the pair of arms 54, 56. Each of the cradle plates 74, 76 includes a slot 78, 80, respectively, for receiving a respective end 82, 84 of a sod roll bar 86 adapted to be received within the central opening 72 of the roll 50. When the bar 86 is received within the opening 72 and the ends 82, 84 are received with the respective slot 78, 80, the support member 32, and more specifically the cradle 70, supports the roll of sod 50.

To prevent the sod roll bar 86 from escaping from the slots 78, 80 in a lateral direction with respect to the vehicle 20, the cradle 70 includes a pair of outer retaining plates 88, 90, each extending from a respective arm 54, 56 of the pair of arms.

Each of the retaining plates 88, 90 is spaced laterally outward from a respective inner cradle plate 74, 76 of the pair of inner cradle plates. The retaining plates 88, 90 prevent the ends 82, 84 of the sod roll bar 86 from escaping from their respective slots 78, 80 when the sod roll 50 is supported by the support member 32.

The support member 32 is pivotally mounted on the frame 22 for pivotal movement with respect to the frame between a lowered position as illustrated in Fig. 4 and a raised position as illustrated in Fig. 5. More specifically, as illustrated in Fig. 5, the support member 32 is configured to raise the roll of sod 50 above the surface 40 and support the roll in the raised position for transportation of the roll prior to unrolling thereof from a storage location on the surface to a predetermined location on the surface where sod is desired to be laid. As illustrated in Fig. 4, the support member 32 is configured to lower the roll of sod 50 onto the surface 40 and support the roll in the lowered position wherein the roll is engaged with the surface 40 and adapted to unroll as the vehicle 20 travels along the surface to lay a length of sod thereon.

Although other means and/or configurations may be used to pivot the support member 32 between the raised position and the lowered position, in one embodiment a hydraulic system (generally designated by 91) is mounted on the frame 22 and the support member for pivoting the support member with respect to the frame between the raised position and the lowered position, and more specifically for selectively raising the roll of sod 50 above the surface 40 and lowering the roll onto the surface for engagement with the surface. In the exemplary embodiment, the hydraulic system 91 includes a standard on-board hydraulic drive (not shown), a hydraulic cylinder 92 mounted to the frame 22 and the cross-member 52 (Fig. 3) adjacent the end 58 (Fig. 3), and a hydraulic cylinder (not shown) mounted to the frame and the cross-member adjacent the end 60 (Fig. 3). Although the power source 28 may be operatively connected to the hydraulic cylinders in any suitable manner without departing from the scope of the present invention to actuate the cylinders to raise and lower the support member 32, in the exemplary embodiment the power source 28 is operatively connected to the cylinders via the hydraulic drive.

In one embodiment, the vehicle 20 includes an operator control (generally designated by 96) mounted on the frame 22 for controlling the power source 28, and therefore the drive wheels 24, and for controlling the support member 32 to selectively

raise the roll of sod 50 above the surface 40 and lower the roll onto the surface for engagement with the surface. Additionally, in one embodiment, the vehicle 20 includes a seat 97 mounted on the frame 22 between the forward end 34 and the rearward end 36 for supporting an operator of the vehicle.

As illustrated in Fig. 4, the vehicle 20 includes at least one weight 98 mounted on the frame adjacent the rearward end 36 to facilitate stabilizing the vehicle on the surface 40 by counterbalancing the support member 32, including the roll of sod 50 when the roll is engaged therewith. Although the support member 32 is illustrated herein as mounted on the frame 22 adjacent the forward end 34, and the weight(s) 98 is illustrated herein as mounted on the frame 22 adjacent the rearward end 36, it should be understood that the weight(s) may be mounted on the frame generally adjacent the forward end 34 and the support member 32 may be mounted on the frame generally adjacent the rearward end 36. Furthermore, other mounting configurations for the weight(s) and/or the support member may be used without departing from the scope of the present invention.

As illustrated in Fig. 3, to engage the roll of sod 50 with the support member 32, and more specifically the cradle 70, the sod roll bar 86 is received within the central opening 72 of the roll and the roll is received within the cradle 70 so the ends 82, 84 of the bar are received within the slots 78, 80 of the cradle plates 74, 76 respectively. In one embodiment, the inner cradle plates 74, 76 each include a tapered forward edge (generally designated by 100) to facilitate guiding the sod roll bar 86 into the slots 78, 80 as the vehicle 20 travels along the surface 40 toward the roll. More specifically, as illustrated in Fig. 4 the tapered forward edge 100 of each cradle plate 74, 76 is defined by an edge 102 extending generally parallel to the arms 54, 56, and therefore extending generally parallel to the surface 40 when the support member is in the lowered position, and an edge 104 extending generally oblique with respect to the arms. When the roll of sod 50 rests on the surface 40 and the support member 32 is in the lowered position as illustrated in Fig. 3, as the vehicle 20 is driven toward the roll the tapered forward edges 100 engage the sod roll bar 86 so the edges 104 guide the bar into the slots 78, 80. Accordingly, the tapered forward edges 100 of the cradle 70 enable the roll of sod 50 to be more easily engaged with the support member 32. Additionally, when the sod roll bar 86 is guided into the slots 78, 80 in such a manner,

an operator may not need to manually lift and/or manually guide the roll of sod 50 into engagement with the support member 32, and more specifically the cradle 70.

Once the roll of sod 50 is engaged with the support member 32 as illustrated in Fig. 4, the support member is pivoted with respect to the frame 22 to raise the support member to the raised position illustrated in Fig. 5. When the roll of sod 50 is engaged with the support member 32, the weight 98 counterbalances the support member and the roll to facilitate stabilizing the vehicle 20 on the surface 40. With the support member 32 in the raised position, the vehicle 20 is driven to a predetermined location on the surface 40 where sod from the roll 50 is desired to be laid. The support member 32 is then pivoted with respect to the frame 22 to lower the support member to the lowered position illustrated in Fig. 4 to engage the roll of sod 50 with the surface 40. As the vehicle 20 is driven along the surface 40, the roll of sod 50 unrolls to lay a predetermined length of sod from the roll onto the surface. The turning radius of about zero degrees increases a maneuverability of the vehicle 20 so the vehicle is more easily maneuvered into position for laying the sod and during unrolling of the roll 50 without causing damage the surface 40, including any sod laid thereon. When the predetermined length of sod has been laid on the surface 40, the support member 32 may be pivoted with respect to the frame 22 to raise the support member to the raised position illustrated in Fig. 5 for transportation to a storage location or to another location on the surface where sod is desired to be laid.

With the exception of the support member 32 and attendant mechanisms, the vehicle 20 may be a conventional zero turning radius utility vehicle such as a _____, commercially available from _____, of _____.

Although the vehicle 20 is described and illustrated herein with regard to laying a length of sod from a roll of sod 50, it should be understood that the vehicle 20 may be adapted for laying a length of any material (e.g., artificial turf, carpet, or any layer of vegetation) on a surface from a roll of such material without departing from the scope of the present invention, whether such material is natural or synthetic. Additionally, although the vehicle 20 is illustrated herein as laying a length of sod on a surface 40 by traveling generally forward along the surface to unroll a roll of sod 50, it should be understood that the vehicle may travel in any direction (e.g., generally backward) to unroll the roll and thereby lay sod on the surface.

The above-described vehicle is cost-effective and reliable for unrolling a roll of material to lay a length of the material on a surface. More specifically, the vehicle includes a pair of drive wheels adapted for selectively independent rotation in both a forward rotational direction and a rearward rotational direction so the vehicle has a turning radius of about zero degrees. The turning radius of about zero degrees increases a maneuverability of the vehicle so the vehicle is more easily maneuvered into position for laying the material and is more easily maneuvered during unrolling of the roll without causing damage to the surface, including any material already laid thereon. Additionally, a support member of the vehicle for supporting the roll of material includes a tapered forward edge to more easily engage the roll of material with the support member for support of the roll. The tapered forward edge may also facilitate engagement between the support member and the roll of material without requiring an operator to manually lift and/or guide the roll into engagement with the support member.

When introducing elements of the present invention or the preferred embodiment(s) thereof, the articles "a", "an", "the" and "said" are intended to mean that there are one or more of the elements. The terms "comprising", "including" and "having" are intended to be inclusive and mean that there may be additional elements other than the listed elements.

As various changes could be made in the above constructions without departing from the scope of the invention, it is intended that all matter contained in the above description or shown in the accompanying drawings shall be interpreted as illustrative and not in a limiting sense.